

G r e e n D e v e l o p m e n t



Executive Summary

This Document is a discussion of goals and strategies for the City of Seattle to facilitate environmental sustainability in South Lake Union (SLU). The goals and strategies discussed below were identified because of their significant potential impact on SLU's future environmental sustainability, in accord with expressed interests of the City of Seattle and local stakeholders. The focus of the report is on cost-effective neighborhood level strategies that the public sector can implement or encourage within a 10-year horizon.

As a result of research on initiatives underway in other cities and countries, interviews with experienced practitioners and analysis of opportunities for integration and innovation, our group developed a set of development strategies that were categorized by issue area (water, energy, habitat, material use, built environment and education) and prioritized in three levels (priority, secondary and additional strategies). Each of the priority strategies were given expanded discussion regarding their context, potential opportunity, and potential implementation strategies. Additionally each priority strategy is accompanied by links and contact information for further research. This document also includes Appendix A, which is a broad survey of green development strategies that are occurring in other regions and countries.

The following is a summary of the selected priority strategies:

Water

- Improve water efficiency throughout South Lake Union.
- Implement an incentive program to encourage integrated innovative stormwater management techniques throughout South Lake Union.
- Encourage the reuse of stormwater stored in detention tanks.

Energy

- Create a Transit Management Association (TMA) or a coordinated transit demand management program in conjunction with businesses to reduce Single Occupancy Vehicle trips within the neighborhood.
- Institute a ground source heating/cooling project and monitor results to create a case study.

Habitat

- An urban forestry program that emphasizes canopy coverage, big trees and species mix to provide cover for South Lake Union.
- Investigate setting ecological minimum targets for residential, commercial, and public buildings using a green area factor/biotope area factor as a measurement tool.

Material use (waste)

- Create a comprehensive program for the reduction of materials used in building through construction waste recycling and adaptive re-use programs.
- Create on-site composting facility in South Lake Union, preferably in conjunction with the Cascade Pea-patch.

Built environment

- Encourage new structures to have light colored roofs.
- Reduce area required for automobiles.

Education and communication

- Create a sustainable development center.
- Create a neighborhood environmental council.
- Use green development for education and marketing purposes.
- Develop neighborhood sustainability indicators to monitor progress, increase public awareness and foster accountability.

Introduction and Purpose

Opportunities within South Lake Union

With a large area available for redevelopment, South Lake Union provides Seattle with a unique opportunity to integrate multiple sustainability strategies in one central, visible location, creating a “green laboratory” in the heart of the city. For residents and business owners, sustainability can provide a unique community identity and spur economic growth while providing for long-term environmental quality.

The area's specific assets include substantial capacity for redevelopment, prime location, receptive stakeholders, positive socioeconomic trends and a large forward-thinking landowner. SLU sits between the downtown core and the shores of Lake



Union, acting as a buffer between the lake and the more intensive development of the central business district. Seattle's leadership and residents are strongly in favor of sustainable development and the city is already working on a variety of green development strategies and incentives. Vulcan, the site's largest landholder, is aggressively pursuing sustainable practices with its triple bottom line strategies. These factors are converging during a period of emerging sustainable technologies and a steady global interest in the implementation of green development.

SLU also presents Seattle with an opportunity to test sustainability measures before implementing on a citywide scale while educating the public and making these measures visible. As a model development, SLU offers an invaluable opportunity to educate builders and citizens about the importance and virtues of environmental sustainability and presents Seattle with the opportunity to build a working, living, and learning sustainable community.

The importance of integrated systems planning

Systems integration is a key element in the pursuit of sustainability in SLU. Integrating efforts to preserve the environment creates the opportunity to minimize the costs of sustainable development while ensuring that the sum of the whole is greater than the parts.

System integration is a key principle in driving the market towards implementing sustainable features, including cost competitive green building projects, regional planning efforts and ecosystem studies. Expanding integration to the neighborhood level is gaining momentum as displayed by U.S. Green Building Council's current project to create a LEED rating system for neighborhood development and adoption in planning.

We envision a SLU environmental sustainability plan that is fully integrated into the area's infrastructure, economic decision-making and social structure to maximize overall effects. Public and private leaders should advocate integration of building and infrastructure improvements within the area's ecosystem to maximize SLU's sustainable development as a whole, greater than the sum of its parts.

Scope

This report is meant to provide a prioritized green development strategy for South Lake Union focusing on select strategies that will allow the City of Seattle to make the most effective contribution to local sustainable development with limited

resources. This report is focused on neighborhood-scale strategies that the public sector can reasonably foster or implement. Currently, there are many resources such as the Vulcan-sponsored Resource Guide for Sustainable Development and ongoing citywide green development initiatives that range in scale from private development to the city and county scale. This document is focused on the unique opportunities that are present in SLU. Consequently, it should be noted that many strategies critical to the success of the neighborhood such as a multi-modal regional transportation system are purposefully left out of this report as they are beyond the scope. A summary matrix in Appendix A provides an overview of additional strategies.

How to use this document

The report is split into six major categories: water, energy, habitat, material use, built environment and education. Each category contains the following information:

1. A goal statement to provide a framework for considering and prioritizing individual strategies.
2. Primary strategies identified as having the best potential for maximum impact.
3. Resources listed under each primary strategy to provide further information about the strategy and contact information where applicable.
4. Secondary strategies identified as potentially beneficial to SLU, but without as great of impact as the primary strategies.
5. Additional strategies that were determined to be not as feasible or effective as the primary or secondary strategies.

Methods and Process

To provide background for the report, a survey of best practices from outside municipalities, industry publications and other sources was conducted. This preliminary research was reviewed in light of South Lake Union's unique characteristics as well as efforts currently being pursued by the City of Seattle to determine their applicability within the neighborhood. A set of overarching goals for green development was also developed from various sources including the City's Environmental Action Agenda, the South Lake Union Neighborhood Plan, the Cascade Neighborhood Council Sustainability Plan, and efforts in other cities and countries.



With this structure in place, we developed criteria for determining strategies that would be most effective in shifting development patterns toward green development and sustainability. They are as follows:

1. Effectiveness in fostering sustainability
2. Financial efficiency
3. Ability to implement (especially through public sector)
4. Compatibility with ongoing initiatives within the City of Seattle
5. Expandability to the rest of Seattle
6. Neighborhood-level scale

Using these criteria, we prioritized strategies for the neighborhood. Those strategies that were found to be most promising were analyzed in increased depth to understand the steps necessary for implementation.

Results and Discussion

Water

Goal: Water flows mimic natural systems of retention, infiltration and runoff while reducing the demand on potable water and reducing greywater and stormwater discharge levels.

Fresh water is a limited resource that must be shared between humans, plants, salmon and other wildlife. The replacement of forests with urban environments has severely altered the natural flow of water. Water now flows over roads collecting pollutants on the way to stormdrains where it is piped to a treatment center. Water is not allowed to permeate into the soil and irrigate vegetation and slowly flow into lakes and streams. At the same time, we use precious drinking water inefficiently including irrigation of our sparse vegetation. This irresponsible use of water threatens our generation and future generations. New technologies and development choices, however, can be used to conserve drinking water and improve water quality.

Water is an especially important asset in SLU. With waterfront access from South Lake Union Park, the neighborhood has a strong connection to water. The

neighborhood plan for this area values its maritime heritage and emphasizes a need to celebrate water. With the proposed new development in this area, an excellent opportunity exists to implement innovative technologies to reduce the demand on potable water, to decrease stormwater runoff, and to reuse water on site.

Primary Strategy: Improve water efficiency throughout South Lake Union.

Require water-efficient landscaping in street design guidelines and in open spaces. This strategy can reduce the amount of potable water demand for irrigation. The requirement could be placed in street and open space design guidelines. For areas planted at the time of new development, it does not cost extra money to use native, drought resistant plants instead of non-native plants. Not only will native plants require less water because they are adapted to the Pacific Northwest's dry summers, they will also generally require less maintenance.

This strategy also supports the goals of improving habitat within SLU by increasing native vegetation which will support native species.



Native landscaping in Seattle. http://seattletimes.nmsource.com/art/pacificnw/2005/0206/cover2_2.jpg

Create a biotech water efficiency incentive program. Biotech and medical facilities use a great deal of potable water for cooling, sterilization, washing equipment, and de-ionizing water. Local Seattle projects exhibit potential for reduced laboratory water demand. The Fred Hutchinson Cancer Research Center with the Saving Water Partnership reduced water consumption by 30,000 gallons a day, saving Fred Hutchinson \$94,000 a year. The University of Washington's Health Sciences facility is saving close to \$500,000 a year from water conservation initiatives. Seattle Public Utilities has created a water conservation Best Management Practices (BMP) report that specifically applies to biotech companies. Currently, the Water Smart Technology Program through Seattle Public Utilities provides rebates of up to 50% for retrofitting buildings with water-efficient technology. Seattle Public Utilities could expand this program to create an incentive program specifically tailored to biotech and medical facilities. It is necessary to promote these incentives to developers and potential biotech companies to make sure they are aware of the cost saving potential and the incentive programs.

References

Saving Water Partnership: Conserve Outside
<http://www.savingwater.org/outside.htm>

Resource Guide for Sustainable Development in an Urban Environment:
A Case Study in South Lake Union
http://www.usgbc.org/Docs/Resources/SLU_Final_10-22-02.pdf

Seattle Public Utilities' Biotech Water Conservation Best Management Practices.
Produced by Roger E. VanGelder, PE

Saving Water Partnership's Water Smart Technology
Fred Hutchinson Case Study
http://www.savingwater.org/docs/medical_casestudy.pdf

Primary Strategy: Implement incentive program to encourage integrated innovative stormwater management techniques throughout South Lake Union.

The majority of the stormwater in the SLU neighborhood goes to the Denny Way/Lake Union combined sewer overflow (CSO) system where stormwater is treated. Even though this system has the capacity to handle stormwater flow in South Lake Union, innovative low impact development (LID) techniques can help manage the peak flows and pollutants that reach the CSO. A small portion of the neighborhood, between Yale Ave. N. and I-5, drains directly to Lake Union. LID techniques can help filter water and reduce pollutants reaching Lake Union. Incentives could be used to encourage developers to use a combination of LID techniques.

The City of Seattle is currently working on an incentive program called Rainwise which would offer drainage rate reductions for owners who use sustainable stormwater management techniques. While this program will not be implemented until 2007, developers who are putting in infrastructure now can benefit from the rate reductions in the future. The following techniques should be included in the SLU incentive program:

Encourage use of greenroofs. Greenroofs include rooftop gardens or more intensely vegetated roofs that have thin layers of soil and draught resistant vegetation over a waterproofing membrane. Greenroofs help retain stormwater

and reduce runoff, counter the urban heat island effect, conserve energy through insulation and provide habitat for birds and insects.



Chicago City Hall
<http://www.asla.org/meetings/awards/awds02/chicagocityhall.html>

According to a stormwater site analysis performed by Seattle Public Utilities in approximately 25% of the sites in SLU, greenroofs will mitigate enough stormwater so developers will not be required to have a stormwater storage tank. This is a direct incentive for developers.

The City could also create incentives to encourage the use of green roofs. For example, the City of Portland provides an Eco-Roof Bonus for developers who ensure the installation,

preservation, maintenance, and, where applicable, replacement of greenroofs. In exchange for utilizing greenroofs, developers are allowed to build additional floor area based on the portion of the building covered by a greenroof.

Encourage use of bioretention and rain gardens.

This low-impact development technique has great potential in SLU. Bioretention is defined by the City of Seattle as a "vegetated area with surface storage and amended soil designed to store, infiltrate, and evapotranspire rainwater" (SPU's Rainwise Incentive Program). Rain gardens are a specific type of bioretention that are planted to look like gardens and are therefore attractive. According to the Puget Sound Action Team, they are low cost, easy to install, can provide habitat for wildlife, and are effective in treating stormwater. Bioretention



Bioretention in Discovery Center parking lot (source "green parking")



in parking lots, traffic circles, or even the proposed Mercer Median, would allow water to infiltrate into underground soil and gravel, filtering out pollutants from automobiles such as oil, grease, sediment, and heavy metals and preventing the water from flowing directly into storm drains. These features also enhance the aesthetics of the neighborhood.

For above ground parking lots, bioretention could be an excellent opportunity for developers. If a parking lot can be designed to handle all the runoff on site using rain gardens and bioswales, then the developer would not have to install expensive



SEA Streets natural drainage system. http://www.seattle.gov/util/About_SPU/Drainage_&_Sewer_System/Natural_Drainage_Systems/Street_Edge_Alternatives/index.asp

stormwater storage tanks. A rain garden case study in Bellingham, Washington, showed that the City saved 75 to 80 percent in construction costs of a parking lot by installing rain gardens instead of a costly in-ground vault.

Pursue possibility of natural drainage system East of Yale Ave N.

While the majority of the stormwater in SLU flows to the combined sewer overflow, a portion flows directly to the

lake. Runoff from some areas East of Yale Ave. N. combined with runoff from Capitol Hill and I-5 flow untreated into Lake Union. In this area of the Cascade Neighborhood, there is potential for a natural drainage system. While the City of Seattle has implemented a number of natural drainage systems in residential neighborhoods (see photo for example), this could be a showcase for how natural drainage could work in a high-density area.

References

Portland's Incentive Program for Greenroofs
33.510.210 Floor Area and Height Bonus Options
<http://www.portlandonline.com/shared/cfm/image.cfm?id=53363>

Contact: Marie Johnson, Senior Planner, City of Portland
(503) 823-7800

US EPA Low Impact Development Center
Vegetated Roof Cover Case Study
http://www.psat.wa.gov/Programs/LID/lid_cd/pdf_docs/LID_ROOF.PDF

City of Bellingham: Reigning in the Rain
Bioretention and Rain Garden Case Study
http://www.psat.wa.gov/Publications/Rain_Garden_book.pdf

Seattle Public Utilities Rainwise Incentives Program
Contact: Denise Andrews (206) 684-4601

Resource Guide for Sustainable Development in an Urban Environment: A Case Study in South Lake Union
http://www.usgbc.org/Docs/Resources/SLU_Final_10-22-02.pdf

City of Seattle Natural Drainage Overview
http://www.seattle.gov/util/About_SPU/Drainage_&_Sewer_System/Natural_Drainage_Systems/Natural_Drainage_Overview/index.asp

Primary Strategy: Encourage the reuse of stormwater stored in detention tanks for secondary uses.

Currently, all buildings in Seattle are required to store stormwater on site in detention tanks. Approximately 25% of the sites in SLU can be exempt from this requirement if they use innovative stormwater management techniques such as greenroofs, but the remaining 75% are required to store stormwater on site in detention tanks. The water in these tanks could be used for secondary uses such as on-site irrigation or flushing toilets. A direct incentive would be that the water bill for the building would be drastically reduced. An incentive program could also be used to give credit for reusing water by reducing the King County drainage tax.

References

King Street Center – uses rainwater to flush toilets
http://dnr.metrokc.gov/dnrp/ksc_tour/features/features.htm



Secondary Strategies:

- Encourage water efficiency in residential developments through promotion of financial incentive programs such as the Water Smart Technology Program the Laundrywise Program.
- Encourage the use of drainage cisterns for collecting rainwater for irrigation
- Reduce impervious surfaces by reducing the amount of space dedicated to automobiles.
- Encourage the use of permeable pavement such as pavers, grid systems, and porous concrete in appropriate locations throughout the neighborhood.
- Install green space that serves as a public amenity and as stormwater treatment.
- Create incentives and remove barriers for the reuse of graywater for non-potable uses.

Energy

Goal: Provide affordable and sufficient energy in a manner that is climate neutral and does not have local health impacts.

South Lake Union's current energy practices are unsustainable in the long term due to their dependence on fossil fuel. As petroleum supplies dwindle and the impacts of global warming grow, significant changes will be necessary to preserve our quality of life. Energy use in SLU in the form of electricity, transportation, building operation and industrial production contributes to local and regional air pollution, global climate change, dependence on foreign oil, energy price fluctuations, and other social, economic and environmental problems. While local energy use is necessarily tied to regional patterns, it is critical that Seattle use SLU as a model to forge green development patterns.

In drafting an approach to these issues, it is critical to understand how energy use is contributing to environmental degradation, particularly global warming and health issues. A 2000 Puget Sound Clean Air Agency study of the Puget Sound region entitled "Roadmap for Climate Protection: Reducing Greenhouse Gas Emissions in Puget Sound" found of the total greenhouse gas emissions, 17% came from electricity, 11% from agriculture, forestry & waste, 23% from buildings and facilities (excluding electricity) and 49% from transportation. The

City of Seattle has committed to the goal of meeting all local electricity needs with zero net greenhouse gas emissions by reducing electricity usage, decreasing overall systems needs, and eliminating fossil fuel use. As an area in which few people both work and live, SLU likely plays a significant role in transportation emissions due to the large commuting population. Consequently, while all aspects of energy use were surveyed in great detail for this green development strategy, particular emphasis was given to transportation patterns in the area as a chief contributor to environmental degradation.

Primary Strategy: Create a transit management association (TMA) or a coordinated transit demand management program to reduce single occupancy vehicle (SOV) trips within the neighborhood.

Automobile transportation is one of the greatest uses of energy within SLU.



The potential addition of a street car to SLU could fit well with TMA's program work. Above is San Francisco's Street Car. (picture "San Fran Streetcar")

As a growing center of business that draws employees from a regional pool, commuting will continue to impose significant negative impacts in the form of greenhouse gases, toxic emissions, decreased quality of life and loss of productivity.

TMA's have proven to be a significant tool for reducing the impact of transportation choices.

The mission of a

TMA is to promote economic vitality by providing transportation programs and services that improve access. Typically, TMA's facilitate this process by providing or coordinating transit passes, bicycling infrastructure such as showers and racks, flex cars, vanpools, ridesharing, and limited parking space sharing. TMA's can also work on advocacy issues by serving as a liaison to the City and by encouraging local businesses to adopt better business practices such as not providing free parking as an unintentional subsidy. The Lloyd District in Portland has seen SOV trips

decrease from 60% to 41.1% since the instigation of their TMA in 2004.

The case for a TMA within South Lake Union is compelling. Benefits that could be realized by creating a TMA include:

- Savings to business in parking space construction. The SLU 2004 Transportation Study estimated the upfront costs of additional parking spaces alone could total \$286 million by 2030 if current levels of driving continue.
- Increased productivity. The same study predicted that the total peak-hour network average delay for the neighborhood would more than double from 3.7 to 8.1 minutes per vehicle by 2030 if changes in commuting patterns do not occur. This loss of time is substantial and could be a source of serious frustration for employees as well as an economic drag on local productivity.
- Reduced exposure to air pollution. Exposure to idling cars represents a serious side effect of increased congestion which could be reduced.
- Enhanced employee benefits. Many people would like to be able to avoid SOV commuting due to cost and the frustrations of congestion. Bike infrastructure, carpooling resources, etc. are a significant employee benefit that could help to attract and maintain talented employees.
- Substantial greenhouse gas reductions. Automobile operation is the largest source of local greenhouse gas production. If Seattle is going to meet its greenhouse gas reduction targets, it will need to deal with automobile pollution.
- Pooled resources create neighborhood-wide incentive to act. A joint TMA program provides added incentive for businesses to adopt better practices as they know other businesses will join them in addressing a neighborhood-wide problem.

The potential for substantial biotech investment represents an additional opportunity for the neighborhood as many companies in this sector require employees to make frequent trips between home and work to check on experiments. Thus, employees of these businesses might be much more receptive to living locally and utilizing opportunities for alternative short distance commuting strategies. This synergy may allow for programs helping employees find local housing as a benefit to the individual, the company and the environment. A TMA might also encourage local employers to provide subsidized loans for employees purchasing a home near their business.

A critical element to be considered is the provision of substantial and reliable funding for a TMA. TMA's are typically funded through Business Improvement Districts and grants from local and state sources. In the near term, this funding might be difficult to obtain as businesses may soon be taxed to support the street car. Extending the BID created for the street car may be a viable option for funding a TMA in the future. The Lloyd District TMA provides examples of other funding sources that may be possible in South Lake Union: parking meter revenue and commission on transit pass sales. Similar to South Lake Union's current situation, Lloyd District originally had few parking meters. As a compromise with business owners, parking meters were installed in the district and the revenue was directed to a TMA. This change served multiple purposes by discouraging commuter parking, reserving parking for local businesses and providing a revenue stream. Consideration of this option should be included in the SLU Parking Strategy that is currently in development. Similarly, a program to sell reduced-cost bulk transit passes to local companies on commission for Portland's Department of Transportation has served multiple purposes by encouraging transit pass use, providing improved employee benefits for local companies and providing a revenue stream. A similar program selling Flex-Passes could be successful. Alternatively, the current funding mechanism for the street car includes bulk ticket sales to local companies which could also be a possible synergy.

As a note of caution, a TMA can not be successful in funding or programming without buy in from the local business community. Critical to the implementation of this recommendation will be extensive outreach to local businesses to demonstrate the financial and environmental benefits. Without their support, a TMA will be ineffective.

References

SLU Transportation Study

www.ci.seattle.wa.us/transportation/southlakeunion.htm
(Transit Demand Management discussion – p. 131-137)

Lloyd District TMA

www.ldtma.com

Contact: Rick Williams, Executive Director - (503) 236-6441

Greater Redmond Transportation Management Association

www.grtma.org



Transmanage

www.bellevuedowntown.org/maps/transmanage.html

Bellevue Downtown Association's Transportation Management Arm

Primary Strategy: Institute a ground source heating/cooling project and monitor results to create a case study

Ground Source Heating/Cooling utilizes the constant temperatures that exist below the earth's surface to greatly increase the efficiency of heating and cooling. Liquid is pumped through pipes that are buried deep into the ground (usually 50' to 300') to exchange heat. Cooling is provided by circulating the liquid which is chilled by cooler ground temperature. Heating is provided by heat pumps which produce heat for the building while chilling the liquid. This chilled liquid is then circulated through the pipes and re-heated by the relatively warmer ground temperatures. This system works especially well in large office buildings that require both heating and cooling all year long.

The technology involved in ground source heating/cooling has been available for a long time; however, it is becoming a much more attractive option as equipment becomes cheaper and more efficient. As fuel prices continue to fluctuate and increase, ground source heating/cooling will continue to make more financial sense both to reduce current costs and to insulate businesses against future price spikes. In the short term, it could also provide a bonus to developers trying to gain LEED certification as it could potentially impact four credits: energy, water reduction (no evaporation cooling), green roofs (removes need for roof machinery) and innovation. A ground source heating/cooling system was recently installed in Bellevue Community College's R-Building and is planned to be incorporated in the South East False Creek neighborhood and a 60-story Shangri-La hotel building in Vancouver, Canada. Bellevue Community College expects to reduce energy costs by 30% with their system.

Ground Source Heating/Cooling represents a unique opportunity in South Lake Union because of the substantial investment in infrastructure that will be made and because the technology is becoming ripe for expansion but has few local examples. As such, a local pilot project has great potential to affect the private development sector well beyond the impact of the project itself. If done properly it could serve as an educational tool, providing financial and technical guidance as well as confidence to local developers, which might help to begin market

transformation.

References

Bob Klug of Seattle City Light is actively pursuing this option

Phone: 206-684-3341

Secondary Strategies:

- Encourage multi-building heating and cooling strategies where waste heat from refrigeration, computer operation, laundry machines, restaurants or industrial operation could be valuable to other users. Office buildings which often require year round cooling in some sections also provide an opportunity for heating/cooling exchange.
- Support alternative energy projects and integration into district energy network.
- Investigate ground source heating, biodiesel, and photovoltaic cells in the short term, with long term investigation of fuel cells and wind energy.
- Encourage "future-proofing" of buildings to allow for installation of alternative energy projects as changing fuel prices make them economically feasible.
- Work with developers to make business case for incorporating high performance energy efficiency measures as a cost effective development strategy.



Integrated Photovoltaics (picture of same name, source freefoto.com)

Additional Strategies:

- Encourage use of micro-turbines with steam co-generation as local energy sources to reduce transmission loss and harvest waste heat where carbon neutral energy sources are not possible.
- Incorporate photovoltaics where they could replace other materials such as shelters, paneling or screening elements to defray upfront costs.
- Explore establishment of micro-grid and pooled energy backup to facilitate future adoption of distributed energy production.

- Explore revising energy code to increase energy efficiency.
- Create energy performance bonds for private energy efficiency initiatives payable 5 years out to guarantee monitoring and compliance.
- Utilize smart metering to increase awareness of energy use and decrease peak time energy use.
- Utilize pedestrian scale lighting to minimize energy needs and light pollution.
- Encourage motion or photocell sensors as lighting cut-offs to decrease night-time energy use.
- Encourage energy efficient buildings through site selection, massing, intelligent envelope (operable windows, shading devices, motorized blinds, etc.), lighting control, thermal storage (thermally massive floors, trombe walls), HVAC systems, etc.
- Support installation of alternative automobile refueling stations, particularly biodiesel.



Habitat

Goal: SLU provides habitat for an abundance and diversity of life forms while providing vital human benefits such as air filtration, shading, water retention, aesthetic impact and food.

Due to its initial industrial development, the current habitat of South Lake Union has large areas of impervious surfaces, few green areas, and lacks natural connections that help to create a thriving habitat for all life forms. An improved habitat would have several benefits in SLU. Increased biodiversity, through the implementation of a diverse landscape that includes forested areas, open space, and natural connections with Lake Union and other areas of the city, would reduce the amount of impervious surfaces in the study area and reduce the heat island effect prevalent in heavily developed areas. Improved habitat also provides natural stormwater reduction through tree canopy increases and various natural drainage techniques. Habitat improvements result in an improvement of the quality of life for all residents, including humans.

Primary Strategy: Create a urban forestry program that emphasizes canopy coverage, big trees and species mix to provide cover for South Lake Union.

Street trees and urban forests can be a valuable addition to promoting sustainability in South Lake Union. Among the benefits of urban forests are increased habitat potential, stormwater retention, air quality improvements, carbon sequestration and reduction of the urban heat island effect. Urban trees also create a pleasant streetscape that enhances pedestrian corridors. Additionally this type of program could create natural and visual linkages with Lake Union and Denny and Cascade parks. Incorporating green walls along with big trees into South Lake Union could increase the effect of this initiative.



This small parcel in SLU is a good example of coniferous and other large trees in a small city owned parcel. (picture "pine small park")

In a report published in 2000 Cascadia Consulting Group estimated canopy cover at 12.5% for the Central Business District (CBD). American Forests recommends 15% for Pacific Northwest CBDs and, as a lower density CBD, South Lake Union could do better. A short-term goal of 15% canopy cover with a long-range objective of 20% is attainable in the study area, especially with a willingness to use conifers and larger trees. This is an achievable goal comparable to the Lloyd District targets in Portland, Oregon of 25% canopy coverage by 2050.

Current strategies that should be adopted to increase canopy cover are the addition of conifers and other large trees (greater than 40 feet). These trees provide much greater stormwater attenuation and maximize the ability to shade buildings from solar gain better than the smaller trees commonly planted. City-owned parcels

that are underdeveloped as parking lots or otherwise provide a particularly good opportunity to increase habitat and create patches of green through planting trees and other vegetation such as bioswales. These trees could then be transplanted as larger street trees as the neighborhood is redeveloped. This would allow the city to easily increase forest canopy and create temporary “nurseries” to provide for long-term needs.

Issues that would need to be addressed at implementation are spacing of trees in relation to planting strips and balancing maintenance needs of conifers versus deciduous trees. Both have advantages depending on location and desired goals within SLU.

References

Urban Forestry at American Forests

<http://www.americanforests.org>

Gary Moll, (202) 737-1944 x220

Cascadia Consulting

<http://www.cascadiaconsulting.com/>

Shane Dewald –SDOT 206-684-5041

Primary Strategy: Investigate setting ecological minimum targets for residential, commercial, and public buildings using a green area factor/biotope area factor as a measuring tool.

Green area factors would provide the City and developers a way to measure the portion of land designated to serving ecosystem functions. This measurement standardizes environmental goals such as:

- Improving the microclimate and reducing the urban heat island effect.
- Maintaining and improving soil function and water quality.



Greenwall photo from www.americanforests.org

- Enhancing the quality of plant and animal habitat.

The green area factor is a ratio of the ecologically effective surface area to the total land area of a development. The ecologically effective surface area includes areas such as open space, courtyards, roofs, and walls. Each type of land use in these areas is given a score between 1.0 and 0.0. Impermeable surfaces would get a score of 0.0 and vegetation connected to the soil below would get a score of 1.0. Typically, green roofs would get a score of 0.7 and green walls would get a score of 0.5

This could be a voluntary program in which the City would set targets for new development to achieve certain green area factor ratings. City staff would provide technical assistance for interested developers and would create an award system based on the ratings, similar to the LEED designations.

References

Berlin, Germany's Biotope Factor

http://www.stadtentwicklung.berlin.de/umwelt/landschaftsplanung/bff/index_en.shtml

Malmo, Sweden's Green Point System

<http://www.map21ltd.com/scan-green/bo01.htm>

Secondary Strategies:

- Increase connectivity and quality of various habitats that already exist in South Lake Union. Green connections should be made between Cascade, Denny and South Lake Union parks to leverage existing habitats via green streets or linear parks.
- Use native vegetation when possible to minimize water needs and provide habitat to birds and other wildlife.

Additional Strategies:

- Encourage edible landscaping for human and animal consumption.
- Utilize rooftops as green space and agriculture opportunities.



Vertical landscaping at the REI building greatly improves the local streetscape. (picture “vertical landscaping”)



- Encourage vertical landscaping.
- Manage parks and open space in a manner that reduces energy and water use without the use of pesticides.
- Consider spearheading an economic appraisal of the benefits of existing and proposed trees in SLU, using a modeling program such as CityGreen.
- Consider areas where leaves can compost naturally.
- Introduce earthworms to planting mix to reduce compaction, add nutrients and supply food.

Material Use (Waste)

Goal: Production of goods should occur in a closed-loop in which end products are utilized in production of other goods and toxics and wastes are eliminated.

The City of Seattle has one of the most aggressive recycling programs in the country. Recycling is mandatory for both businesses and residential units and due to the program 60% of the waste stream is diverted from landfills. Additionally, they have begun a program to offer curbside compost pick-up for residential units to be sorted with yard waste. These programs have accomplished much but can be built upon in South Lake Union with two strategies that reduce transportation costs and impacts, making sustainability more visible while closing production loops within the neighborhood.

Primary Strategy: Create a comprehensive program for the reduction of materials used in building through construction waste.



Construction Recycling Photo via <http://www.umich.edu>

Construction waste will be a major component of the South Lake Union redevelopment and an aggressive recycling/reuse program could minimize landfill needs, reduce transportation costs and demonstrate what incentives are available. Currently LEED provides up to 11 credits for recycling and reuse of over 50% of waste by weight and an additional 2 points for over 75%. While King County Metro currently has programs available for recycling, an opportunity exists to deal with transfer/exchange of

these materials on site, saving transportation costs and creating a local re-use program based in SLU. This could be done on a city lot that is awaiting future redevelopment. The City of Seattle should also investigate a refundable deposit that contractors will get back if they will recycle at a certain level (50% in San Jose, California). This deposit would allow the city to educate contractors as to available programs and outlets for construction waste recycling. With over 3-5 pounds of construction waste generated per square foot, a biotech lab of 25,000 square feet would generate up to 62 tons of construction/demolition waste, so increases in diversion could result in large increases for the sustainability of South Lake Union. Additionally, diversion will save anywhere from 10-38% in disposal costs according to the Southeast False Creek Water & Waste Management Plan.



On-site composting. www.americanforests.org photo credit composting.jpg

References

Southeast False Creek Management Plan
<http://www.city.vancouver.bc.ca/commsvcs/southeast/index.htm>

King County
<http://www.metrokc.gov/dnrp/swd/construction-recycling/>
 Kinley Deller (206) 296-4434

Primary Strategy: Create a local composting facility in South Lake Union.

Local composting facilities would allow for organic matter to be used in the neighborhood. It could create a closed loop system in conjunction with the P-Patch, rooftop gardens and urban agriculture initiatives. Currently, the City of Seattle is offering composting of yard waste to residents of the city. This strategy in SLU would build on that by encouraging local use of this resource. This strategy would most likely be implemented at the Cascade Neighborhood P-Patch site or another P-Patch within the neighborhood as is done at other P-Patch sites. Local composting would provide a source of organic material for the P-Patch and gardens in the neighborhood while eliminating transportation and disposal costs by removing it from SLU. This is a project that could be coordinated by community groups within SLU.



References

Southeast False Creek Management Plan-
<http://www.city.vancouver.bc.ca/commsvcs/southeast/index.htm>

Primary Strategy: Encourage adaptive reuse of existing buildings.

Adaptive re-use of existing structures should also be considered where appropriate. This eliminates the need for new materials and can preserve existing neighborhood character while displaying creative reuse. Further information on adaptive reuse can be found in section 7.

Additional Strategies:

- Work with contractors to design comprehensive, integrated waste, recycling and compost plan for each building that simplifies and integrates collection, handling and, where necessary, off-site disposal.
- Provide recycling stations in common areas of commercial buildings and kitchen of residential to facilitate recycling.
- Encourage installation of equipment such as compactors and waste recycling chutes.
- Use high recycled content materials such as concrete with fly ash to minimize use of new product.
- Use locally-produced materials and seek alternatives to imported materials first as they represent the largest energy expenditures.
- Use Rapidly Renewable Resources (RRR) such as bamboo to minimize damage in harvest of materials.
- Use Forest Stewardship Council (FSC) certified wood to guarantee that sustainable forest practices were used in harvesting.
- Foster a local network of demolition and building contractors to create a market for recycled and salvage materials.
- Encourage and facilitate multi-building heating and cooling strategies where waste heat from refrigeration, computer operation, laundry machines, restaurants or industrial operation could be valuable to other users.
- Support recycling and reuse through the creation of a sustainable development center that helps identify and catalogue alternative materials and develop guidelines for their incorporation into specifications.

Built Environment

Goal: Facilitate a built environment structured to enhance the quality of surrounding natural environments.

Building activity will likely be an enormous influence on the South Lake Union area for the next decade and, as a result, the face of SLU will change. The coordination of the built environment with the natural environment is a difficult and often expensive venture. Albeit the good environmental will of SLU's major developers, the City of Seattle should recognize income requirements and influence green development decisions with regulations that have minimal affect on project cost. Recognition and prioritization of these measures is integral to SLU green development.

Primary Strategy: Encourage the use of light colored roofs on all new structures.

Covering an immense portion of the urban environment, roofs make up a great deal of urban surface area. Varying roof colors in urban areas can have substantial impacts on local temperatures.

Requiring that all new roofs in South Lake Union be of light color to reflect rather than absorb heat is an easy method with minimal cost to reduce urban heat island effects. Furthermore, light colored roofs can lower cooling loads which would reduce energy use during warm summer months. This may be attractive to renters and developers who recognize potential energy savings.

Chicago and San Diego have utilized incentive programs to encourage light colored roofs. Light colored roofs will have no additional cost to developers and require minimal certification effort.

Free municipal program design and consulting is available at the Cool Roof Rating Council (CRRC), <http://www.coolroofs.org/>. CRRC also includes information about specific roof products/materials that have further environmental attributes including recyclable contents.

References

Cool Roof Rating Council, Oakland, CA
Contact: Sarah Van Mantgem, Administrative Manager – (866) 465-2523
Sarah@Energy-Solution.com



Primary Strategy: Reduce street and on-site parking area.

Reducing the area required for parking spaces should be considered. Increasing oil prices, rising demand for smaller more efficient vehicles, SLU mass transit/alternative transit infrastructure and general SLU area demographic trends highlight future demand for smaller, more efficient vehicles.

Reduced areas for local vehicular use would be a progressive recognition of the trend towards smaller cars that will likely result in SLU and greater Seattle. Reduced automobile area would increase pedestrian, bicycle and green space. These attributes would encourage local non-automotive traffic and raise the aesthetic appeal and value of the space while allowing increased pervious surface materials that are less rugged than standard street pavement. This should be coordinated with green street efforts to maximize benefits.

References

City of Portland Bureau of Planning, Environmental Planning Team
http://www.psat.wa.gov/Programs/LID/portland_parking.pdf
Contact: Tom Carter, City Planner—Portland Bureau of Planning
(503) 823-5772

Secondary Strategies:

- Investigate site-specific zoning incentives.
- Certain spaces provide great potential to drive sustainable social activities. For example, a daycare located along a bike trail may enable parents to deliver children to daycare while bicycling to work. Recognize similar opportunities and give developers Floor Area Ratio incentives to provide them.
- Create toxic building materials inventory.
- Take inventory of cost effective substitutes for toxic materials within common structures. Often greener building techniques are not adopted because of the time cost of finding substitutes. Facilitate this connection for builders.
- Replace minimum parking requirements with parking caps.
- Impervious parking surfaces take up a large amount of space in urban areas; provision of this space is expensive to developers. Often large amounts of parking are underutilized. Allow developers to decide how much parking to provide for specific uses. Let developers who reduce parking investments to increase green site design or green building

investments.

Additional Strategies:

- Promote mixed-use, transit-oriented development in accordance with SLU's urban center designation.
- Create safe, comfortable and enjoyable pedestrian environment.
- Reuse existing buildings where possible.
- Investigate feasibility of moving residential structures to new locations instead of demolishing new homes.
- Orient buildings to maximize benefit from solar energy.
- Encourage day lighting and natural ventilation. Consider encouraging narrow building floor plates to facilitate this process.
- Encourage development that allows longevity, flexible use and recycling of building after use.
- Encourage development of buildings that can easily incorporate sustainable technologies such as alternative power or greywater when it becomes profitable.
- Change parking lot requirements to include landscape treatments that add vegetation, provide shade and buffer parking lots.
- Recognize indoor environmental quality as an important consideration including access to natural light, view, air quality, ventilation and acoustics.
- When building public facilities, integrate environment considerations into proposal RFP and bid processes.
- Encourage integrated building design.

Education and Communication

Goal: The principles of sustainability must be communicated to the public in order to ensure personal responsibility, make natural process visible and celebrate successes.

Education and communication are key elements to the saturation of new ideas into the social framework. Sustainability is a growing social trend in the Northwest; however, people are still unacquainted with evaluating the costs and benefits of green development over time. Education should be highly accessible and interesting for all age groups.

Within the Seattle area, numerous resources exist for researching and adopting sustainable practices in building, purchasing and lifestyles. Fostering the relationship between sustainable technologies, practitioners, and interested parties



should be a top priority of anyone attempting to promote green development.

Primary Strategy: Create a sustainable development center.

Our research into urban sustainability has highlighted the fact that while a great deal of information and resources exist, there is little comprehensive coordination. The great efforts of the vast array of entities pursuing sustainable development should be coordinated in an educational clearinghouse environment. As interest grows among citizens, non-profit groups and builders, a sustainable resource center would be an important tool to facilitate and make visible the value of urban sustainability.

Moreover, the substantial and growing collection of City programs and incentives for green development should be available in a single location so that developers and builders can take advantage of these opportunities early and often. This matter is critical because early integration of green development is necessary to make it cost effective.

A multi-story building, resembling future SLU construction, with a full time staff and other integrated uses would serve as a strong resource for interested parties. This building might also include 1) citizen educational and recreational resources, drawing tourists and boosting commerce, 2) space for community meetings or organizations.



*Natural Capital Center Portland, OR.
www.darkwing.oregon.edu*

Chicago and Portland both have sustainable resource centers. Chicago's Center for Green Technology is a resource for local builders and citizens interested in sustainability. They provide space for workshops and learning activities as well as tours. Portland's Natural Capital Center is a striking embodiment of the City of Portland's commitment to sustainability. The center provides synergy for environmental offices located within and is a physical model of sustainable building practices. Given the large amount of development that will occur in SLU and the growing interest in sustainable building amongst developers, Seattle should take this concept and provide similar

resources to the city and guide local sustainable development.

References

Chicago Center for Green Technology

<http://www.cityofchicago.org/Environment/GreenTech/sub/how.html>

Contact: Grace Troccoli (312) 746-9771

gtroccoli@cityofchicago.org

The Natural Capital Center

<http://www.ecotrust.org/NCC/>

Contact: Sydney Mead, Center Manager – (503) 467-0767

sydney@ecotrust.org

Primary Strategy: Create a neighborhood environmental council.

This council could be a part of existing neighborhood groups such as SLUFAN. The purpose of the group would be to promote environmentalism within the neighborhood and to educate residents. The council could monitor progress in the neighborhood, coordinate the implementation of the recommendations of this report, and organize projects such as neighborhood block group challenges to get community members involved and excited about sustainability. Because South Lake Union will be a dense neighborhood, the council could also create challenge programs between housing developments, such as recycling and composting challenges.

Primary Strategy: Use green development for education and marketing purposes.

The Community Identity section develops this strategy further in section 1.

Primary Strategy: Develop neighborhood sustainability indicators to monitor progress, increase public awareness and foster accountability.

A critical aspect of our overall green development strategy will be monitoring the results to gauge the success of each initiative and to make changes where progress is not being made. In order to measure performance, we recommend a set of neighborhood sustainability indicators be developed and monitored regularly. While necessary to gauge the impact of the rest of the strategies, efforts should be made to ensure that measurement does not take away resources from

implementation. Selected indicators should be reflective of the neighborhoods goals and strategies, broad in scope, easy to understand, easy to measure, and reliable. Moreover, they should build upon data that is either already collected or can be readily recorded. Below is a partial list of indicators that should be considered:

Primary Incentives

- Water use
- Electricity use
- Transportation mode split
- Waste generation
- Recycling rates
- Percent tree cover
- Impervious surface

Secondary Incentives

- Water discharge to sewer system
- Percentage of buildings receiving LEED certification
- Amount composted
- Area of community garden
- Distance of bike lanes
- Bird populations
- Vegetation diversity
- Percentage of construction material recycled
- Number of citizens involved in green development tasks
- Percentage of area within half mile of important amenities

Depending upon the programs implemented, specific indicators measuring the effects of specific programs might also be useful.

As comparison of different business types can be a misleading exercise, consideration should also be given to whether residential and commercial/ industrial uses should be measured separately and whether per capita or per floor space are appropriate normalizers. For example, electricity may be reduced if industrial uses are pushed out in favor of office jobs; however this would not necessarily be an indicator of positive change. An indicators project could also be expanded to measure other sustainability objectives not considered in this report such as social and personal health.

References

The Northwest Center for Livable Communities

NWCLC began the development of sustainability indicators for SLU but has not yet finished the project.

depts.washington.edu/nwclc/

Southeast False Creek Sustainability Indicators Report to City Council

www.city.vancouver.bc.ca/ctyclerk/ccclerk/20050301/ph2.htm

Sustainable Seattle: Active in neighborhood indicators

www.sustainableseattle.org

Secondary Strategy:

- Monitor economic & environmental benefits of programs.
- Economic consultants can provide insight into the complicated relationships between dollar values and the environment. Economic impact analyses will highlight promising relationships that are currently unrealized.

Additional Strategies:

- Provide holistic “green audits” to private companies to foster green development.
- Use an interpretive sign system to display green development projects, water flows, rainwater reuse, and other green strategies.
- Develop an arts approach that features ecological artists.
- Create self-guided sustainability tours of the neighborhood’s sustainable assets.
- Evaluate the potential of festival at South Lake Union Park celebrating sustainability, potentially as a city-wide Earth Day event.

